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27 1
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LOANS FOR WELLS RAISE QUESTIONS

Water Well Economics Needs Study

Is it cheaper in the long run to spend more in the beginning for a better water well? You can readily answer, "yes" — provided, of course, the extra money that you invest actually goes into better construction and better materials that insure a longer life for the well. We raise this question in order to discuss it in the light of the low-cost credit being extended to farmers to pay for new wells under the Water Facilities Act.

Congress passed a bill in July, 1954, making it possible for farmers all over the country to get loans at reasonable interest rates to install or improve farmstead water supplies and irrigation facilities, and to undertake certain measures for soil conservation. The farmer may borrow from a bank or other private lender, with the loan insured by the government, or he may obtain a loan directly from government funds. A considerable proportion of the money will be spent for water wells. The whole program of credit for farm water supply focuses attention on three factors:

1. The importance of adequate farm water supplies, particularly for irrigation, throughout the country.
2. The importance of ground water development to supply irrigation requirements.
3. The economics of well construction, particularly as it relates to building wells that will last at least long enough to see the loans paid off.

Farmers in seventeen western states have had access to government credit since 1937 to help them pay for wells, pumping equipment and irrigation systems. A law known as the Water Facilities Act of 1937 was passed that year which applied to these seventeen states. The 1954 law broadened the program and extended water facilities loans to farmers in all states.

Farms Need Water

The Farmers Home Administration of the Department of Agriculture is responsible for setting up the whole program, investigating each application, determining the amount of each loan and collecting the payments on the loans.

The fact that Congress considered this credit plan desirable enough to enact the law emphasizes the importance of adequate and dependable water supplies to an agricultural economy. In the arid regions of the western states, water has always been a precious commodity — "water rights" on farms often being worth more than the land itself. In the Middle West, South, and East, where normal rainfall is usually adequate for crops, water supply has been taken for granted. Drought conditions of the past two or three years in some of these states, however, have caused widespread water shortages and have emphasized that the timing of rainfall is too often undependable even in the

Irrigation well in Idaho delivering 1,500 gpm, or 2.1 million gallons per day. In this locality, a 16-inch well equipped with a Johnson Well Screen, 1,500 gpm pump, electric motor and controls costs about $12,000. Total cost, including test drilling and miscellaneous items, figures out less than $7,000 per million-gallons-per-day of capacity.

more humid regions.

The Department of Agriculture, in supporting this legislation for the farmer, has said:

"In areas of the country normally considered humid, there has been an increasing interest by farmers in water facilities to supplement rainfall in the production of some crops, in the maintenance of year-around pastures, and in the introduction of other practices for increasing production.

"It has been shown that the use of irrigation systems prevents serious losses of income during periods of drouth in these areas.

"There is ample evidence of an extensive need in the less arid areas of the country for the development and improved use of water supplies for farm homes, for livestock and for irrigation of small gardens.

"According to a preliminary report of the 1950 census of housing, approximately one-half of the 5,894,000 occupied rural farm dwellings have no running water. This condition undoubtedly exists in many instances because of a lack of developed sources of water or a need for replacing or improving existing sources.

"Frequently the development or improvement of suitable water supplies is so costly that it cannot be accomplished by farmers from available farm income in any one year.

"The availability of adequate credit on suitable terms for water development and utilization is one of the important factors in obtaining any desired improvement of this condition."

In the areas affected by recent drought conditions, the ground water tables have gone down until they are at about the lowest levels ever reached. Wells that were not drilled to the proper depth originally to permit operation under these conditions have gone dry. Many farmers have hauled water month after month for livestock and for house use. At the same time, they have seen their crops burn up from lack of rain. These experiences have led them to the conclusion that they must not only have more dependable wells to supply water for stock and domestic purposes, but that wells to supply water for supplementary irrigation when rainfall is deficient are sorely needed to help make the farm economy more stable.

Municipalities and industries have also been affected in the drought areas by the drying up of surface reservoirs and by the lowered ground water levels. With the means of financing available to them, towns and industrial plants have drilled additional wells without delay, many of them being done on more or less an emergency basis.

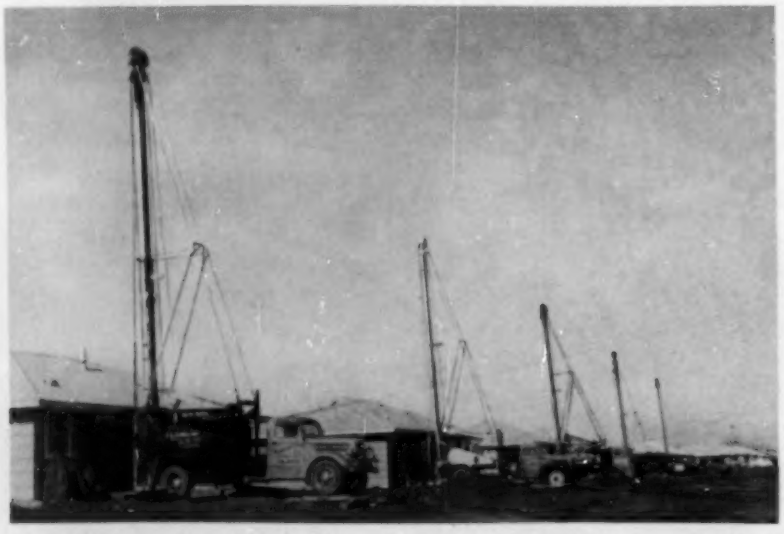
Good Wells Get the Water

Now, serious as the ground water shortages have been in some areas during the past year, we are not running out of water. In most areas where the water table has dropped due to drought, it will come back up again after two or three years of high rainfall — and it will do this in spite of reasonable increases in ground water pumpage, if the wells being pumped are suitably designed and located with respect to the geologic and hydraulic conditions that nature has set up in each case. (Some ground water sources are overdeveloped in limited areas, to be sure, where wells have been drilled and pumped without regard to the natural limitations of the aquifer and the normal recharge from rainfall or other sources.)

The water shortages experienced by the majority of farmers and by many towns and industries have come about because of skimpy well construction and lack of appreciation of the geologic and hydraulic factors governing the ground water supply in each case. For example, it is a fundamental fact that ground water levels have always dropped when rainfall is deficient and have returned to higher levels when rainfall is abundant. However, thousands upon thousands of wells drilled when the water tables were at high or normal levels have not been carried deep enough to allow for any drop in level during drought periods without going dry.

Very often the driller has advised the owner to make the well a few feet deeper to allow for varying water levels.

- ***Farmers apply for either an insured-type loan or a direct loan at the local county office of the Farmers Home Administration. A three-member county committee familiar with local agricultural conditions passes on the applications. These loans will be arranged only for those unable to get necessary credit on reasonable terms from private sources without government insurance.***
- ***A farmer can borrow up to $25,000, but most loans will probably be less than half this amount. Water users' organizations, irrigation and drainage districts, soil conservation districts and the like can borrow up to $50,000.***
- ***Security for the loans will be the best liens obtainable on the farmer's chattels or real estate. No doubt many loans will supplement existing first mortgages.***



Five drilling machines of a total of 13 working on the same housing development at Bloomfield near Minneapolis. Four-inch wells are being drilled by these rigs in place of 2-inch wells originally planned for these houses. After drilling 40 of the smaller wells, on one part of the project, they were found to be inadequate for the remaining 60 homes. These houses were rapidly constructed while the question of proper well-size was being debated and were without water when virtually completed. The builder could have saved money and headaches by not trying to barely get by with the smallest possible wells in the first place, and by having a few test holes drilled in advance of his operations.

Many an owner, however, has ignored this advice because the investment in the well would have been increased one or two hundred dollars by deeper drilling and by added length of well screen. Now they must drill a new well or deepen the old one at a cost several times the amount they thought they were saving.

Incompetent well drillers who have not made a sufficient study of the geologic and ground-water conditions in their own areas have advised owners improperly on some occasions. They have often sold jobs at lower prices than more experienced drillers by assuring the owners that entirely adequate wells could be obtained by penetrating the aquifer to minimum depths and by using cheap materials.

Geologic Factors Important

Lest someone may misunderstand the point, we should explain that drilling deeper is by no means the only factor involved in adequate well construction. Where good water-bearing formations are non-existent, suitable wells cannot be made at any depth. But we want to emphasize that where favorable conditions do exist, the proper depths for wells that will provide a sufficient and a dependable water supply are dictated by nature's geologic and hydrologic factors in each area. Good well construction results when it is geared or tailored to these factors.

Figure 1 shows one type of situation that illustrates the point here. The open-end well shown on the left, which has the end of the well casing only a few feet below the normal static water level, runs into difficulty very quickly with any lowering of the water table. The well itself is very inefficient because of the small amount of opening afforded for the water to enter the well casing. This means that there is more drawdown than necessary in the well even under good conditions. Then if a lowering of the water table is experienced, the pumping level drops accordingly and the well is either completely dry or can yield such a small amount of water as to make its use impractical.

The well represented by the middle sketch is provided with a short well screen but with the well screen set near the top of the water-bearing sand. This is a great improvement over the open-end construction, because the well is probably ten times as efficient as the open-end well. This means that the drawdown for a given rate of pumpage is much less and therefore the pumping level will be higher under normal conditions. Then if the static water level drops due to any cause, there is still some room left for lowering of the pumping level before the well runs out of water. However, under severe drought conditions where the water table might drop several feet, this well would go dry, too.

The sketch on the right shows the proper well construction under the conditions pictured. Here the well is carried down to an adequate depth in the water-bearing sand. The well screen is set either at the bottom of the aquifer or sufficiently deep in the body of water-bearing sand so that normal fluctuations in the water table will not cause failure. A drop in the water table might require that the pump be set a little deeper than it would be normally, but the well will continue to yield a dependable supply of water even though a two or three year drought period may be experienced. The first cost of this well is more than either of the other two because of the greater depth of drilling required. However, the increased life that has been built into the well means that its annual cost over a long period of time will actually be less than the others.

Irrigation Wells Lead

Most of the loans made under the Water Facilities Act will probably be made to finance irrigation wells. We have already pointed out that more and more farmers in the Middle West, South, and East are finding it economically desirable to supplement rainfall with water from wells. The total rainfall in these areas is generally enough to grow most crops, but it often doesn't come at the right time to insure highest yields. Tests show too that more water at the right time helps crops mature earlier.

The usual means of providing irrigation water, up until the last 10 or 15 years, has been to build a dam, create a reservoir, carry the water from the reservoir for miles in canals, conduct it in many smaller ditches to individual farms and then run the water in furrows through the fields. More recently, improved knowledge of ground water de-

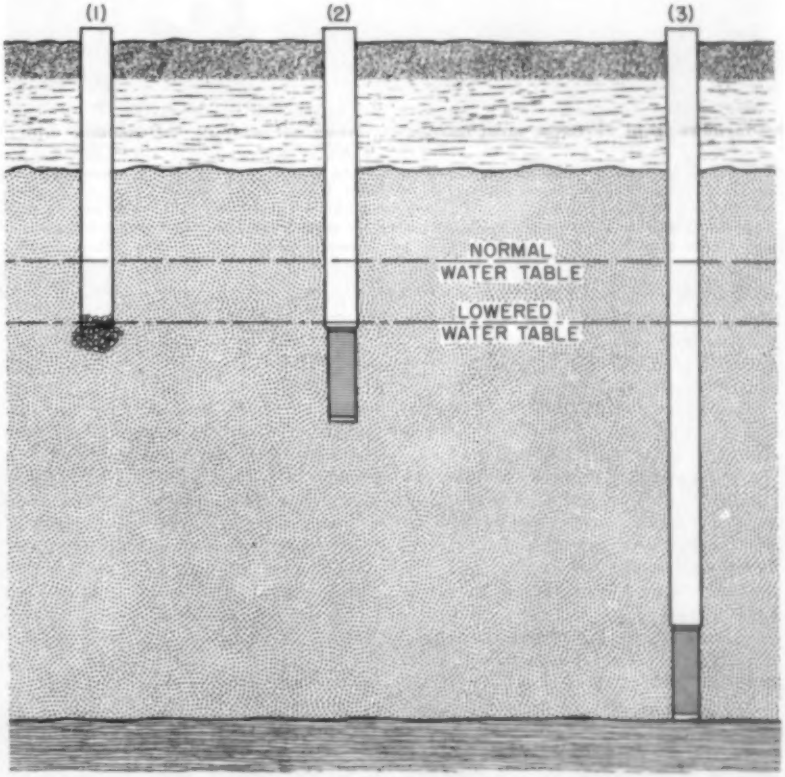


Figure 1. The "open end" well shown on the left is not only inefficient because it affords such a small area through which water can enter the well but also because a limited drop in the water table will cause the well to go dry. The middle sketch shows better construction but does not take full advantage of the ground water reservoir provided by nature. The third well on the right is constructed to take best advantage of the natural conditions. For domestic wells a short screen is usually adequate; for larger yield a longer well screen would be used.

Installing 18-inch Silicon Red Brass well screen, 40 feet long in well 115 feet deep for City of Zenia, Ohio. Drilling contractor was G. M. Baker & Son of Columbus. Consulting engineer was Ralph L. Woolpert Co. of Dayton. Completed well was tested for 26 hours at varying rates from 1,000 gpm to 2,000 gpm. While operating for several hours at 1,700 gpm, the drawdown was a little over 15 feet. The well is to be put in service pumping 2½ million gallons per day.

velopment, use of more efficient well screens, improved vertical turbine pumps and ingenious application of portable sprinkler irrigation systems have changed the picture.

Where favorable aquifers exist, even though at depths up to 300 feet below the land surface, irrigation by pumping from wells can be done at unit costs equal to or less than those for the gravity-type irrigation projects that get their water from surface-water sources. Direct cost comparisons are meager, but the tremendous number of irrigation wells drilled in the last 10 years is impressive evidence that ground water development for irrigation is economically sound.

Industrial Water Costs

To get an idea of relative costs, it may be of interest to make a comparison of estimated costs of industrial water supply from ground water and surface water sources. Figures for the cost of large supplies for industrial use from surface water sources were worked out in a study completed in 1952 for the U. S. Bureau of Mines.*

In each case, the required supply was 13 to 14 million gallons per day, about ¾ of the total being used without treatment and ¼ filtered for process and sanitary needs. Estimated construction costs included the reservoir and dam (where required), pipe-line to the plant, pumping station, one-day storage basin at the plant and filters. The construction cost per million-gallons-per-day capacity was calculated for each of 233 possible sites.

The lowest cost water supply installations were those on large rivers where no reservoirs were required. Among the sites not needing reservoirs, the construction cost per million-gallons-per-day (700 gpm) of installed capacity was about $80,000 for the lowest 10 per cent in this group. About $32,000 of this represents the cost of filters for ¼ of the supply. If filtration could be eliminated, the estimated construction cost for the low-cost sites would be $48,000 per mgd (700 gpm) of installed capacity.

Next above the lowest cost group were the construction costs on two other sites without reservoirs, each requiring eight miles of pipe line, which came to $167,000 and $197,000 per million-gallons-per-day. Costs of other installations with longer pipe lines were, of course, much higher than these figures.

Where reservoirs had to be planned to store water to carry through dry seasons, construction costs of the most economical of these sites started at about $150,000 per mgd. The majority of the jobs with reservoirs, however, were estimated to cost over $300,000 per million-gallons-per-day of capacity.

By comparison with these figures, construction costs for industrial water supply from wells offer considerable economy.

In areas where ground water conditions are favorable, for example, industrial wells yielding two million gallons per day (1,400 gpm) can be constructed for about $40,000 each, or about $20,000 per-million-gallons-per-day of installed capacity. These costs are to be compared with the lowest cost surface water installations. They include cost of the site, the well itself, pump, motor, electrical controls, pumphouse and pipe line to the point of use.

Annual Costs

Construction cost, or first cost, is not the only important factor in water well economics, as we have already indicated. Quality of construction that will insure long life and low maintenance is of equal or greater concern. Compare, for example, an irrigation well that costs $10,000 and lasts seven years with one costing $12,000 that lasts 10 years because of better construction. Here is how they pan out, assuming the money is borrowed at 5 per cent interest:

	CHEAPER WELL	BETTER WELL
First Cost	$10,000	$12,000
Depreciation, per year	1,430	1,200
Interest, per year	250	300
Repairs, per year	200	50
Taxes and insurance, per year	100	120
	$1,980	$1,670

*These cost studies for water supply were developed for possible synthetic liquid fuel plants by Malcolm Pirnie Engineers of New York. Mr. Richard Hazen (of Hazen and Sawyer, Engineers) supervised the work. This was part of a survey of possible synthetic liquid fuel plants for the Bureau of Mines. Ford, Bacon and Davis, Inc. of New York had the general contract for the overall survey.

Obviously, the cheaper well turns out to be the more expensive one to own. If power costs were included here, the comparison would favor the better well even more, since it would have less drawdown and so less fuel or electricity would be needed to operate the pump.

The foregoing comparison is more conservative than actual practice, particularly where the cheaper well pumps sand because a suitable well screen was not installed. The sand pumping well may last only two to four years, whereas the sand-free well is likely to last more than 15 years.

The importance of the well screen for a well completed in sand and gravel formations can hardly be over-emphasized. A recent pamphlet titled, "Water Wells for Farm Supply in Central Illinois," says:*

"Commercial well screens should be selected by the driller after a water-yielding bed has been penetrated and examined. The purpose of the well screen is not only to maintain the open hole and to admit water to the well but also to enable the driller to pull the fine portion of the formation through the screen and remove it from the well. This is called 'well development,' a process which requires that slot openings in the screen be carefully determined on the basis of the size of grains in the water-yielding bed. One objection to using slotted casing rather than commercial well screen is that the size of the slot openings rarely is appropriate for the particular formation."

The material of the well screen also has a great deal to do with the life of a well. Experience has proved that corrosion-resistant metals like Everdur, type 304 stainless steel, and silicon red brass give longest service. Galvanized Armco Iron screens have given good service in irrigation wells where the water is not aggressive and where the wells are pumped only a few months each year.

Municipal Experiences

Some towns have used concrete screens in wells because they are generally cheaper than screens made of corrosion-resistant metal. The average life of concrete wells, however, has been less than that of wells equipped with Everdur, stainless steel and brass screens. As the result of shorter useful life, the lower first cost of the concrete well figures out to be a higher cost per year.

A town in west central Illinois, for example, drilled a 48-inch concrete well in 1924. It pumped 30 gpm per foot of drawdown. This well was operated for 23 years, until 1947. In 1928, a 16-inch well, equipped with a brass well screen, was drilled about 240 feet from the older well. This well was cleaned out in 1940 but is still operating after 26 years. When last tested it had a specific capacity of 33 gpm per foot of drawdown. A second concrete well, 32 inches in diameter, was drilled in 1930. In 1940, the top section of its porous concrete screen failed and was repaired. At that time the specific capacity of the

*Illinois State Geological Survey, *Circular 192*; Urbana, Illinois, 1954; by John W. Foster and Lidia F. Selkregg.

On an insured-type loan, a bank, insurance company or other private agency lends the money and the government guarantees repayment. The farmer pays 3½ per cent interest to the lender plus 1 per cent annual insurance charge. A total of $25,000,000 of insured credit is available for this type of loan.

If the insured loan cannot be arranged, the Farmers Home Administration may lend the money directly from a fund of $11,500,000 voted by Congress in 1954. This direct loan bears interest at 4½ per cent but no insurance charge.

Length of each loan will be fitted to the borrower's ability to repay. Loans to individuals must be for less than 20 years and loans to non-profit organizations must be for less than 40 years. Furthermore, no loan will be set up for a term exceeding the useful life of the improvement or of the security.

Well No. 2 for Adams Fire District in Massachusetts, drilled by R. E. Chapman Company of Oakdale. The well is 101 feet deep and is equipped with a Johnson Well Screen. It is being tested at 1,400 gpm with 14 feet of drawdown. Note the use of two pumps and two orifice meters. This contractor often tests his large wells several days continuously to prove dependable yield.

well was 24 gpm per foot of drawdown. The concrete screen failed again a few years later and the well was abandoned in 1945, having given less than 15 years of useful life.

In 1949, a city in Michigan needing more water obtained quotations from various drilling contractors for a well that could be expected to deliver 750 gpm. The contractor submitting the lowest price proposed a 20-inch diameter well with a porous concrete screen 28 feet long and was awarded the contract. The well pumped 750 gpm with about 38 feet of drawdown. Three years later, in 1952, the well started to pump sand. Investigation indicated that the screen was broken off a few feet from the top. An 8-inch suction pipe on the turbine pump extended down inside the screen several feet and the original contractor offered the opinion that vibration of this suction pipe broke the screen. Thus what appeared to be a low-cost well at first turned out to be a very expensive well since it requires an entirely new screen after only three years of useful service.

Sand-Pumpers Cost Plenty

Cold facts on extra costs resulting from sand-pumping wells show, beyond any doubt, the economy of using a well screen to insure sand-free operation. Detailed costs were run down on two irrigation wells in western Oklahoma.

One 16-inch well drilled in the spring of 1953 was completed to a depth of 315 feet. The lower 40 or 50 feet of the casing was torch-slotted. Total construction cost, including a 1,000 gpm pump and motor, was $8,680. The well pumped about 600 gpm and quite a lot of sand. After 50 days of operation in 1953, the pump was badly worn and had to be pulled for repair. This was the repair bill:

Pulling pump	$135
New pump parts	743
New bearings	92
Re-set pump	135
Total	$1,105

After the repaired pump was back in service it again gave trouble so the owner simply stopped using the well for the 1953 season. Because of all the interruption in his water supply due to pump damage, his crop did not have enough water and the yield was reduced by at least one-third.

The driller on this job had given the owner a guarantee on the well and so was called back early in 1954 to stop the sand pumping or drill another well. He drilled another well nearby with the same slotted pipe construction, absorbing part of the cost himself, and charging the owner $1,735 for the second hole. The owner also paid $135 for pulling the pump and $432 for additional repairs. The second well pumped 500 to 600 gpm and some sand. The owner started to irrigate but pump trouble due to sand interrupted his 1954 program and he got a poor crop for the second year. His plan now is to buy a new set of smaller bowls at a cost of $623 plus $270 for pulling and resetting the pump. The capacity of the smaller pump will fit the yield of the well better, but he will probably continue spending money for pump repair.

The construction of this well, as it now stands, totals $10,415. The farmer spent $1,672 for pump repair the first two years and is now faced with a further bill of $893. Furthermore, he lost a substantial part of his crop both years. The well originally constructed would have cost $11,000 if it had been equipped with a properly-designed well screen. A properly constructed sand-free well would have saved the cost of pump repair, would have provided the water for the lost crops, plus giving the farmer a dependable supply for years to come. Whether or not his slotted-pipe well will ever give him a full season's irrigation is anybody's guess.

● The farmer should get technical help from private firms in planning improvements. The Soil Conservation Service and the Agricultural Extension Service will also give engineering assistance. The Farmers Home Administration will determine that the improvement is practical and that cost estimates appear complete and reasonable. It will also evaluate the economic soundness of the proposal.

● If a state regulates appropriation and use of water, the farmer must get a water right if water development is involved. In a state that permits, but does not require, filing for a water right, the applicant must file as an added protection for his loan. He must show the Farmers Home Administration that the supply of water will be adequate, that his use of the water will not interfere with vested rights or existing established uses, and that other users or owners are not likely to contest his use.

A second case in Oklahoma for which costs were secured is a 20-inch irrigation well, 360 feet deep, with a 1,000 gpm pump. This well also pumped sand when completed. The driller recommended a well screen but the owner considered the screen an unnecessary expense and ordered the driller to use slotted pipe in the water-bearing formation. The total construction cost was $9,600 including pump and motor.

After operating 10 days, the pump required repair. This was the bill:

Pulling pump	$130
Repair parts	921
Miscellaneous labor	50
Re-set pump	130
Total	$1,231

Moving the sand pumped from the well cost another $100 and the farmer lost three weeks of irrigation.

After further use in 1954, the pump is again worn out. Although rated at 1,000 gpm at 1,750 rpm, the pump will only deliver half this capacity when driven at 2,300 rpm. Operating the engine at this high speed causes it to overheat and this recently cost the farmer $125 in engine repair. The yield of grain was only 25 bushels per acre from 120 acres because of interruption of the 1954 watering. An adjacent irrigated farm produced 57 bushels of grain per acre. The farmer is now faced with abandonment of this well and the drilling of another to replace it.

The original 20-inch well with a properly-designed well screen would have cost about $11,900. The farmer has already spent $10,956, his pump now needs repair to the tune of about $900, he lost half of his 1954 crop, his well still pumps sand and will probably be abandoned.

With repeated experiences of this kind in areas where it is the custom to complete wells with perforated pipe, can there be any serious question about the soundness and economy of investing in a good well screen as an essential part of a well?

One Lesson Not Enough

In 1945 and 1946, a farmer near Alliance, Nebraska, paid for four 36-inch irrigation wells that failed, one after another, because of sand pumping. The wells were about 200 feet deep and were gravel-packed with clean one-inch gravel. Ten-guage, 18-inch galvanized pipe that had been machine-perforated was used instead of a well screen.

The water-bearing formation was a fine-grained loose sand that simply ran like sugar through the large voids in the gravel and the punched openings in the

perforated pipe. Each well pumped such quantities of sand that one man had to stay at the well to shovel sand away from the discharge pipe. The wells all collapsed from sand pumping. When the first one failed, the owner had a second one drilled; and thus, in turn, the third and the fourth. Each well was constructed like the previous ones. In trying to use the wells, the farmer wore out the pump and had to buy a new set of bowls. After the fourth well failed he had no more money.

At the prices prevailing in 1945-46, this farmer spent $8,000 for the drilling of the four wells, $750 for pump repair and $400 for labor in moving sand — a total of $9,150 exclusive of the original cost of the pump and motor. He got no crop income from his irrigation expenditures and he has no well. In comparison, if he had employed a driller that knew or would get proper advice on the correct size of material for the gravel-pack and would install a well screen with openings of the size suited to the gravel-pack, he would have had a good well the first time. The cost of this well, including the well screen, at 1945-46 prices would have been about $4,750 (exclusive of pump and motor). He would have saved $4,400 and would have gained a year's crop worth three times this figure.

In 1951 Richard E. Hansen, instructor in agricultural engineering at Kansas State Agricultural College, reported the results of actual tests on irrigation wells in a talk before the Kansas Water Well Drillers Association entitled, "Irrigation Pumping Plant Efficiencies and Costs." Among other things, Mr. Hansen concluded as follows:

"High costs were found to be mostly due to the fixed costs*, which make up a large portion of the total cost . . . The cost of power units of equal size was widely variant because of the quality of the engine purchased. But most noticeable was the high pumping costs of low yielding wells which in part was probably due to overdesign of the pump and motor.

"I think the main point in the reduction of costs is the improvement of the unit regardless of the source of power. Here the improvement of the well itself is vitally important."

These experiences, and thousands of others like them, demonstrate the high cost of poor well construction. Buying poor quality pumping equipment and poor motors or engines is equally costly. Well screens properly designed and selected to fit the water-bearing formation are essential to good well construction in sand and gravel aquifers. Quality well screens cost much less than well failures.

It would seem that those who loan money to finance irrigation wells ought to insist upon materials and methods of construction meeting adequate standards. Suppose a farmer already hard-pressed for money because of drought borrows $10,000 for ten years and his well fails in three years. Will he get more credit to drill another one while still owing $7,000 on the one that has gone to pot? Or suppose he is saddled with a pump repair bill of $1,000 per year in addition to other operating costs. Doesn't this seriously affect his ability to make the required payments to retire the loan?

When someone asks, "Is it safer to pay a little more for good well construction?" — answer him emphatically, "Yes."

*Editor's Note: First cost divided by useful life is the major part of what are called "fixed costs."

A Great Tradition

In almost every corner of the earth, the Red Cross is recognized as a symbol of the good neighbor. It may represent you — through your membership — in helping other people in time of trouble. Or it may represent warm-hearted people, whom you do not know, rallying to your aid in an emergency.

There was a time in our early history when people counted entirely on direct help from their neighbors or close relatives to see them through periods of misfortune. Our way of life stems largely from that personal, across-the-fence sharing of adversity.

Today life is more complex. Many of us live in the impersonal atmosphere of great cities. Much of our population shifts back and forth across the country, hardly finding time to get acquainted with new neighbors. The protective unity of families is weakened as individual members scatter from the home community.

But people have not changed. In time of trouble, they need assurance that they are not alone. To help provide this assurance, millions of Americans turn to their Red Cross. Because they join and serve, they are able to extend a friendly hand to those who most need help.

We see that help in the millions of pints of blood freely given through the Red Cross for those who would die without it. We see it when a New England fisherman who lost his boat in a hurricane is given another so he can earn a living for his family. We see it in emergency help to the family of a serviceman who is away from home.

When the Red Cross answers the call of those in need, Americans keep alive one of our great traditions — friendly, neighborly help to our fellow men.

Unique Drilling Method Is Used

An Italian drilling firm, Trivellazioni Sondaggi of Milan, has developed some interesting methods of sinking large diameter well casing. Wells one meter (39.37 inches) in diameter are drilled regularly by this contractor. Steel casing, almost 40 inches in diameter, is sunk to the full depth of the well. Sections of well screen are centered inside the casing and the space between the screen and the casing is filled with suitably graded gravel. The outer casing is pulled as the gravel is put in.

The picture above shows the special bucket or "grab" used to remove material from inside the outer casing as it sinks. The grab is similar to an "orange-peel" bucket. Note how the derrick of

the hoist is provided with stiff legs for support.

The unique operation in drilling these large diameter wells is shown at the right. Two arms equipped with hydraulic jacks rotate the casing as the work proceeds. Note the heavy collar that grips the large casing to permit moving it in this way. The picture also shows a new section of casing being welded on.

This Italian firm uses its method to drill through hard clay layers, compact conglomerates and boulder nests, in addition to normal sand and gravel formations. In 1943, a well 329 feet deep was drilled in Turin and the contractor says that depths up to 450 feet are possible.

Louisville, Kentucky, plant of the B. F. Goodrich Chemical Company which uses large quantities of ground water from wells equipped with Johnson Well Screens. Geon Polyvinyl resins and Hycar American Rubber are manufactured at this extensive and modern chemical plant. Throughout the chemical industry, Johnson Well Screens are used to insure sand-free wells of maximum efficiency wherever water is obtained from sand and gravel formations.

Aamot Well Company of Minneapolis setting a 6-inch Johnson Everdur Well Screen, 10-foot long, with No. 35 slot openings, in a 51-foot well for Trailer Towne at Richfield, Minnesota. The well delivered 75 gpm on test at 2½ foot drawdown.

Here and There

Well drillers and well owners who have trouble with iron bacteria which cause wells to drop off in yield by depositing iron and slime on well screens and in the surrounding water-bearing sand may never have thought of the connection between the grief they experience and the origin of certain deposits of iron ore. Anyway, the following paragraphs quoted from the magazine "Iron Age" tell the story.

Bugs to Iron

"Iron and steel are very directly associated with a form of actual life — iron-depositing organisms which help to make some kinds of iron ore, according to American Iron and Steel Institute.

"The best-known of the so-called iron bacteria and other organisms is the bacterium leptothrix ochracea, which appears to be capable of self-nourishment on inorganic compounds. These microscopic bugs were busy in prehistoric times helping to form rich deposits of bog iron ore, or limonite, to be used by man millions of years later.

"The leptothrix bacterium does not create iron but processes it. Living in iron-containing water, it absorbs the iron from the water and deposits it as insoluble ferric hydroxide. This oxide forms an iridescent scum on the surface of water, often seen in wayside ditches. The oxide then sinks to the bottom, ul-

timately to form bog iron ore."

Thirsty Hens

Poultry raisers who are fussy about having good wells apparently know that plenty of water means more cash for them. The Minnesota Farm Bureau Service Company says that adequate water supplies are a "must" for top egg production. It says that farmers should have plenty of watering devices because water is more important than other essentials, such as fats, carbohydrates, proteins, fibre, minerals, vitamins, and anti-biotics. Without water constantly available, none of these can be utilized by the hens.

A good supply of clean water, kept as cool as possible, serves many functions. A few of these are:

1. It helps dissolve feeds so that the processes of digestion can take place.
2. It carries digested feeds through the blood, to all parts of the body.
3. It is essential to normal elimination of waste products.
4. It helps maintain normal body temperatures.

If layers don't have adequate water, they don't eat; and if they don't eat, they don't lay.

Elephant Wells

Recent wildlife studies in Africa reveal that elephants dig wells. Certain areas of Africa experience several months of drouth each year and the streams dry up during this period. Wild animals of these regions are hard put to find drinking water — but many of them have learned to depend on the elephant.

Elephants wander upstream on the sandy beds of the dry creeks, searching out places where ground water is close to the surface. At suitable spots, they use their trunks to scoop out pits a few feet deep in the stream beds to reach a foot or so below the water table and thus provide primitive wells. Other animals follow the elephants during the dry season to take advantage of these wells for drinking water. Elephants are well-known for their exceptional traits and this instinct to excavate for ground water can be added to the list.

Please Note

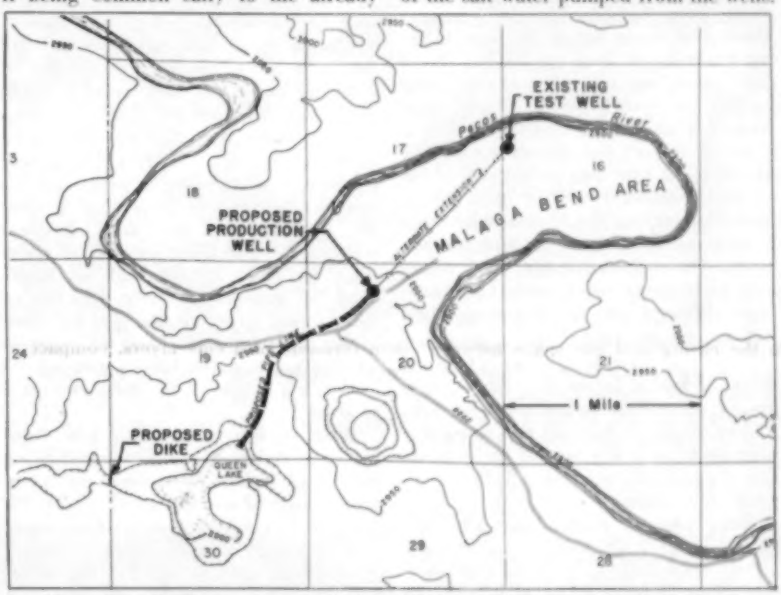
To make it easier for our customers to contact us, we are installing an additional telephone line. This will necessitate a new number, and from **MARCH 1, 1955, TO MAY 30, 1955, IT WILL BE NESTOR 2555.**

AFTER JUNE 1, 1955, OUR NUMBER WILL BE MIDWAY 6-2555, because of the nation-wide revision of telephone exchanges.

Wells Dry Up Salt Springs?

A novel use of wells to remove enough water from a salty, water-bearing formation to cause salt springs fed by this aquifer to dry up has been proposed by the U. S. Geological Survey. The springs in question discharge brine into the Pecos River at the Malaga Bend in New Mexico. A report, prepared by the U.S.G.S. and the Pecos River Commission, describes the possibility of pumping enough salt water from wells for this purpose. The brine would be wasted into a dry lake to evaporate.

The salt springs now add about 420 tons of dissolved salt a day (370 tons of it being common salt) to the already heavily mineralized water carried by the river. The salt water from the springs further damages the quality of the river water and endangers irrigation projects located down stream from Malaga Bend.



In a three-mile reach of the river at the Bend, ground water seepage into the river averages about 1,100 gpm, enlarging the stream by this quantity. Of this seepage, about 900 gpm is the return of irrigation water from the nearby irrigated lands. The other 200 gpm is saturated salt water from the springs. This brine comes from an aquifer in the lower part of the Rustler formation that underlies the Malaga Bend at a depth of about 200 feet. The salt water moves up through thin, fractured beds of gypsum and clay into the overlying alluvium and thence into the river.

Controlled pumping of one or two properly located wells drilled into the Rustler formation would lower the water level in the aquifer below river level. This would stop upward movement of the salt water into the sand bed of the river. The sand of the river bed is pretty well filled with brine now, so drainage of the alluvium would require a little time. However, substantial improvement in the quality of the river water below the Malaga Bend is expected within about three years after the wells are put in operation.

The Queen Lake depression about two miles southwest of the Malaga Bend is a favorably located basin for storage of the salt water pumped from the wells. If the wells are pumped at 200 gpm, this basin would store water for about 100 years of pumping. The Queen Lake depression is not absolutely water tight, but it will probably become more nearly water tight in time. Compaction of the bottom of the depression with a roller of some type would help to seal it.

The use of wells to reduce the seepage of salt water into the Pecos River and storing the salt water in the Queen Lake basin would obviously be an experimental project. The data that could be collected on the effect of pumping, on the conditions around the lake and on the improvement of water quality in the river would be very valuable. Experience would show up changes in pumping procedures that might prove to be necessary, and also supply data for similar applications of water wells in other comparable circumstances.

Map courtesy U. S. Geological Survey.

TOM'S COLUMN

Well, it's been a busy time for most of us these last few weeks, between th' holidays and the new year starting with all th' work of closin' off th' books fer 1954. Taking inventory an' all th' rest of th' details that go along with gettin' things into good order is quite a job for us all. Nowadays it ain't like it used to be when I first started out. Back in them days I was on my own; but now I've got a partner who's real fussy about th' way I run my business an' keep my books. No, I don't mean my son. I mean th' same partner as you've got — Uncle Sam. Bless his pestiferous britches! He's a great ol' fellow; but sometimes I think he sticks his nose too far into all of his nephews' business. Then most of us have "junior partners," too, who want to know all about it — our state governments. Oh well, that's life! Th' young men in business today never knew anything different and us ol' timers might jest as well get used to it.

It ain't *all* been bad, either. For one thing, it had a lot to do with starting lots of us to keep better book records. An' we began to find out that good records could be a big help to us — probably enough t' pay for all the extra work they cause.

Now, when it comes 'round to this time o' year I always like to sit back an' do some looking back over th' year that's just ended. I like to talk things over with my son an' pick out a few things that we might have done better. That way we make a lot of our mistakes pay some dividends. This year we picked out quite a few things we're going to change. Two of 'em, I think, are worth telling about.

More Detailed Records

One thing we're goin' to do is carry our records into quite a bit more detail than we have before. We got together with our bookkeeper and th' C.P.A. who audits our books, an' we spent a couple of long sessions settin' things up to get more information without costing us hardly anything more. It was a case of tryin' to make our records work harder for us in return fer all th' work they put us to. I think it's goin' to pay off big.

We have had a pretty good general idea of our costs. From our records we know about how much we have to get for a job of one kind or another in order to come out with enough profit so th' year will turn out O.K. if we keep busy enough. Now that has been good as far as it goes. In fact, it's darned important information to have, and it's just as important to keep it up to date. We wouldn't feel safe doin' business without it. But there are lots of questions we can't answer that we might need the answers for pretty bad one of these times; so we reckoned it was time to set up to get th' facts an' figures necessary for getting these answers.

Here's a couple of th' things we want to know.

What are our merchandise sales doin' for us? Are they really doing O.K. or should we reduce or increase our work on this part of our business? Sure, it's easy to find out that we sold so many dollars worth of stuff, made so much gross profit, took so much write-off on accounts and inventory, an' paid so much for labor and store help — which left us so much net profit. But is that th' whole story? How about our service calls, an' repair work on this stuff? Are they properly charged or are they getting pretty much lost in th' general overhead and makin' their own picture look too good? In sales costs, too, are they just carryin' themselves or are they doing better or worse than that? Would it pay better to limit our merchandising to fewer lines, or spread it out more, or is it about right th' way it is? Which lines are good or bad — and how good or how bad?

What About the Shop?

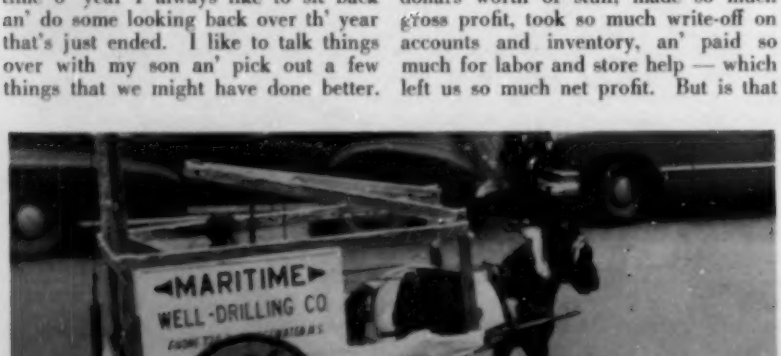
Then there's our shop. It's a pretty good little shop with better than average machine tools in it. We do most of our own work an' lots o' repair an' rebuilding jobs for our customers. There's a big question whether we would actually be ahead if we cut it down so we would do jest th' work we need done ourselves an' can't get done in other shops th' way we want it done. Can we charge our customers enough to cover our real shop costs without hurting our good will instead of building it up?

"We'll hire you, Higgins, but you've still got a lot to learn!"

By th' time next year rolls around we expect to have some straight answers to these and a lot of other questions — not all just figures, but also facts on how our job leads came to us, what complaints we got, what lines brought us th' most inquiries, and so forth for quite a long list — all tied in with our record system, with very little extra work once it's set up to go.

Maybe this sounds like a lot o' boloney to some of you, but I'm sold on it. By keepin' close tab on something along this same line during th' last couple of years, we learned some facts that are goin' to save both us an' some of our customers money an' trouble in th' years to come. These were facts about our prospect drilling.

We do a lot o' this work ev'ry year. We've done it fer a good many years — much of it with th' same engineers an' often for the same companies. Sometimes it's prospectin' for a water supply.



Model drilling machine used as a float in the parade of the Lunenburg County Exhibition by Cecil Johnson of the Maritime Well Drilling Co., Bridgewater, Nova Scotia. Mr. Johnson pressed his son's pet pony into service for the occasion.

Other times it's for foundations. Once in awhile it's for sewer lines, or water mains, or gravel deposits, or what have you? But almost always during these jobs there'll be times when we have to stand by, or run extra shifts, or make some other arrangements outside of th' regular run of th' work. This can't be helped because sometimes there are important decisions that have to be made as th' work progresses; and it might take th' engineers and owners somewhere from a day to a week to come up with th' right answers.

Good Records Pay Off

Most of this work we got was on a job basis, with just certain equipment extras provided for. When we bid th' jobs we'd have to do some educated guessing to cover th' hidden extra costs. Sometimes we came out about right — other times we lost our shirt or made so much we felt ashamed. We kept good records on all of these jobs fer two years, an' last month my son tabulated th' results. He came up with some interestin' facts such as these:

We would have been better off if we had gotten our regular average hourly earning rates for our machines, equipment an' men. Our customers would also have been better off. (There were a few exceptions to this, but there was more total paid out by them under th' job basis than there would have been under the hourly basis.)

It may seem impossible for it to be better fer both of us, but it's a fact. You see there was times when we was standin' still when we had enough in th' job to pay part of th' whole cost, but if it had been on an hourly basis all th' customer would pay for would be th' hourly cost of what equipment was being tied up, and we would be free to use our crews and other equipment on other work.

Engineers Benefit Too

The engineers would have been better off under th' hourly basis, too, because they could fit th' progress of the work better into their own picture so they could use their engineers to best advantage at less cost. They'd have a lot better control of th' work this way, too.

We gave th' facts to th' two engineerin' firms an' to several of th' private an' public service companies that we have been doin' most of this work for, an' they all changed their ideas when they saw it in black an' white. From here on, I expect this work will be bid on hourly schedules for men, machines, an' equipment so there will be a lot less guessing going on.

You can sometimes talk yourself blue in th' face tryin' to put across this kind of an idea an' not convince anybody — maybe not even yourself. But if you've got th' cold facts an' figures on what the jobs actually did cost in th' past, an' what they would have cost if they'd been done the other way, you can sell the idea fast to yourself an' to your customers.

Well, I'd better cut this off before the editor cuts it half in two.

Yours for a good 1955 and better business records.

Yer ol' friend,

Tom

Elmer Crain of Boyne City, Michigan, drilling a well with his Sullivan rotary for a summer home on the shore of Lake Charlevoix.

The two best times to fish are "right before you get there" and "right after you leave."

The lady of the house told the new maid to be sure and dice the beets for dinner. After four hours work, the new maid came in to the mistress and said, "Madam, cutting them beets up is pretty easy, but puttin' all those black dots on 'em is quite a job."

"My first turkey!" exclaimed the bride proudly, as they sat down at the table.

"It looks swell, darling," said her husband. "What did you stuff it with?"

"Stuff it with? Why honey, this one wasn't hollow."

There are a thousand hacking at the branches of evil to every one who is striking at the roots.—Thoreau

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To the blonde dancer who had just finished her act in the floor show the rich young man said sadly, "Tell me, why do you, a beautiful, talented — and apparently educated girl — dance in a sordid joint like this?"

"I don't know," she answered just as sadly, "unless it's because I meet a great many more prominent young men here than I did when I was a public librarian."

Son: "Dad, why do they rope off the aisles at weddings?"

Dad: "So the bridegroom can't get away, son."

The village blacksmith found an apprentice and immediately began his instructions to the lad: "When I take the shoe out of the fire, I'll lay it on the anvil; and when I nod my head, you hit it with the hammer." The apprentice did just as he was told. Now he's the village blacksmith.

Every chair in the doctor's waiting room was taken. Some of the patients talked for a while and then silence fell. Finally one old man stood up wearily and remarked: "Well, I guess I'll just go home and die a natural death."

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul 14, Minnesota.

New Mexico

One of the newest drillers' organizations, the New Mexico Water Well Contracting Association, held its second meeting last October at Albuquerque. Details of the formal organization of the association were completed and a constitution was adopted. Annual dues of $100 per year for active members were established. The association has 23 active members and several associate members.

The members decided to hold meetings every two months at various places throughout the state. Officers of the association are Van R. Turner of Albuquerque, president; George Perry of Glencoe, vice-president; Howard Sheets of Albuquerque, secretary-treasurer; and Eugene E. Klecan of Albuquerque, executive secretary. Mr. Klecan is an attorney who will serve the association on a part-time basis. The association invites every drilling contractor in New Mexico to join and lend his support to the program which will benefit the entire drilling industry in the state.

Minnesota

The Minnesota Water Well Contractors Association has completed its plans for an outstanding convention and exposition to be held at the Hotel Nicollet in Minneapolis on March 24, 25 and 26. This will be another of the very attractive conventions for which the Minnesota association is noted. Outstanding events, interesting programs and many exhibits of materials and equipment will make a valuable three days for all the drilling contractors in the state.

An important item on the program will be the discussion of the drillers' licensing bill which has again been introduced in the Minnesota Legislature this month. This legislation is of great interest to the entire drilling industry of the state and it needs to be guided by the thoughts and suggestions of the drillers in order to be workable and of value to the industry.

Those attending the convention will be the guests of manufacturers and suppliers at the annual banquet and show which will be held at 6 P.M. on March 26. Following the banquet there will be dancing at which all will be guests of the Association. Norm Ovrom, executive secretary, 1495 West Larpenter Ave. of St. Paul, is arranging all details of the convention.

Nebraska

The University of Nebraska will again be host to the outstanding conference and short course of the Nebraska Well Drillers Association on February 16 and 17. Excellent technical sessions and good entertainment will fill the two-day program. The Nebraska meeting is known both for its quality and its popularity among the drilling contractors of the state. A record attendance is expected.

The manufacturers and suppliers will entertain those attending the convention at the annual Dutch Lunch on the evening of February 16. A large number of exhibits of materials and equipment will also be displayed by these firms. Exhibits and meetings will be held in the Bancroft Building of the University on North 14th Street in Lincoln.

South Dakota

March 3 and 4 have been selected by the South Dakota Well Drillers Association as the dates for its annual convention. The meeting will be at the Marvin Hughitt Hotel in Huron. A good program and excellent exhibits are being arranged.

All those interested in the details of the meeting, which are being worked out now, are asked to write to Kermit Meier, secretary, at White Lake.

Colorado

After a most impressive convention on November 12 and 13, the Colorado Water Well Contractors Association is off to a flying start in an active program for 1955. Every feature of the convention was thoroughly interesting and enjoyable. Each committee that had a part in organizing the convention did a fine job.

The members present at the business meeting made an important decision to employ an executive secretary for the association. It is felt that the lack of someone working in the Association's interest throughout the year has hampered the results that the group could obtain for the well drillers of Colorado. Although involving the expenditure of a considerable sum, the drillers feel that they ought to finance a full-time executive secretary for at least one year to see what results can be accomplished. Accordingly they directed the board of directors to undertake the plan, and Luther Symons of Denver was employed for the year 1955. His office is at 3791 Williams Street in Denver and will serve as a clearing house both for information and for action in the affairs of the association.

Officers of the association for 1955 elected are: F. C. Eddy of Moffat, president; Virgil Segelke of Wiggins, vice-president; Fred Pearson of Englewood, secretary-treasurer; D. A. Holden of Hudson, L. L. Canfield of Fort Morgan, Art Price of Sedalia, and Floyd Oliver of Greely, directors.

Wisconsin

The annual meeting of the Wisconsin Well Drillers at the Hotel Schroeder in Milwaukee on March 31, April 1 and 2 will be unusual in more than one respect. The Wisconsin Well and Pump Suppliers, Inc., which is an organization of manufacturers and jobbers, is putting forth every effort to have the best display of well supplies and equipment that the Wisconsin group has ever seen. The manufacturers and suppliers are also going to conduct a panel discussion on pump installation and pump problems as one of the principal sessions on the program.

Another innovation is the extending of an invitation by the drillers to all licensed pump installers in Wisconsin to attend the convention. Because of the state licenses required in Wisconsin for both well drilling contractors and pump installers, both groups have many common interests. The drillers are taking the initiative by inviting the pump installers to this convention in order to get acquainted with them and discuss common problems.

The Association will set aside a special booth in the exhibit room for use by the Wisconsin State Board of Health. This will provide a place where drillers can discuss problems with representatives of the Board of Health in connection with the well drilling code and the licensing of both drillers and pump installers.

The association asks that everyone register in advance by mail so that a better idea of the number of persons attending can be secured. This will help the convention committee to organize all the events properly and provide for entertainment of the drillers and the ladies who will be attending. Milwaukee is an excellent convention town and a fine time is assured at the 1955 Wisconsin Well Drillers Convention.

New York

The Empire State Water Well Drillers Association held its annual meeting in Poughkeepsie on January 19. A helpful

discussion on the common problems confronting the well drillers of New York and an excellent talk by David Smith of the Chester Tube Co. on the metallurgy of pipe provided the program of the day.

At the annual business meeting of the association, Gordon Gould of Chatham Center was elected president. Robert McLean of Germantown is vice-president; Robert E. Klindt of Morris is secretary-treasurer.

In addition to the business sessions, a fine social time was enjoyed by all present.

Iowa

Perhaps it ought not to be reported, but the fact is that the Iowa Well Drillers Association picked the coldest days of the year to hold their annual meeting on January 26 and 27. Could it be that the low temperature accounted for the improved attendance? Actually the number of drillers registered represented a 50 per cent increase over the meeting a year ago, which is very encouraging for the Association.

The topics of interest that were discussed at the business meeting included ethical standards for the drilling industry and the possible legislation that may be proposed this year which would affect Iowa well drilling contractors. A legislative committee consisting of Arthur Bruinekool, T. W. Thorpe, and Sylvan Ames was appointed to follow proposed legislation during the current session of the state legislature.

Officers for the year 1955 were elected at the final business meeting. Howard White of Waterloo is president; Travis Parker of West Branch is vice-president; and Burr Zander of Coulter is secretary. The board of directors consists of Frank McCutcheon of Des Moines, Charles L. Jennings of New London, and Andy Verwers of Sully. All Iowa drillers that could not attend the convention should send their 1955 dues to the secretary, Burr Zander, at once.

Illinois

Forty-four manufacturers and suppliers set up a record number of exhibits for displaying materials and equipment for water wells at the annual meeting of the Illinois Water Well Drillers Association held at Rockford on January 12, 13 and 14. This is one of the largest group of exhibitors at any state drillers' meeting.

About ninety well drilling contractors were represented by the 120 persons who registered attendance as drillers. A large number of ladies accompanied their husbands to this meeting. The meeting included a number of excellent subjects on the technical program and some fine social events in addition to the regular business meetings.

The outstanding item on the program was a panel discussion by members of the Illinois State Geological Survey under the title, "Down to Earth." The panel headed by state geologist John C. Frye put on a most helpful and interesting discussion of practical geology of Illinois for the water well driller. Other subjects on the program included a talk on group insurance, a review of ground water levels in Illinois during 1954, and an explanation of the loans available to farmers for water facilities and soil conservation.

At the final business meeting, Henry Boysen, Jr., of Libertyville was re-elected president; Glenn Lyons of Stockton is first vice-president; Adolph Schmidt of Zion is second vice-president; and C. Leslie Johnson of Princeton is secretary. Robert Parks of the State Geological Survey at Champaign continues as service secretary.

North Dakota

The annual Convention of the North Dakota Well Drillers Association was held December 9, 10 and 11 at Minot. Although an excellent program had been arranged by the committee, the attendance at the 1954 meeting was not as great as had been expected. However, the best drilling contractors of the state were there. North Dakota drilling contractors who did not attend are expected to send their dues for 1955 to the secretary to maintain their active membership for the coming year. In order to speak for the whole water well industry in North Dakota, the association needs a good representation of the drillers as active members.

Fred J. Simpson of Bisbee was re-elected president for the coming year, John Bakken of Wahpeton is vice-president, and Fred V. Sletvold of Oakes is secretary. Charles Porter of Park River was elected to the board of directors.

All North Dakota water well drillers should boost the influence of their association by active membership in the group and by promoting the interests of their industry throughout the state.

Indiana

Final plans for the convention of the Indiana Well Drilling Contractors Association were completed at a meeting of the directors in January. The dates for the annual meeting are February 23 and 24; the place is the Hotel Severin at Indianapolis. An instructive program has been arranged that will appeal to every Indiana driller.

All available display space has been taken. This, together with the increased membership of the Association, will make this the best convention in the history of the organization. Social events include a buffet supper and show the first evening and the annual banquet the second evening. Other entertainment for ladies attending will be arranged on both days.

Pennsylvania

Committee reports and plans for the annual meeting were the order of business at the last joint meeting of the Pennsylvania Water Well Contractors Association on October 30 in Bedford. Harold Rulon was selected as representative to attend meetings of the Maryland drillers group from time to time to develop an effective liaison with them.

The annual meeting of the Association will be held at Penn State College on April 1 and 2. As always, this is the big meeting of the year and all Pennsylvania drillers ought to attend. Penn State will do all possible to provide the best of facilities.

(Continued on Page 15)

H. K. Carr and Son of Greentown, Indiana, operate four cable-tool machines. They are largely engaged in drilling blast holes for stone quarries but this picture of a 4-inch well being drilled for a home near Marion, Indiana, shows that they do water-well jobs too.

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE: Three Bucyrus-Erie 22W drilling machines mounted on good trucks. No tools. Price, $4,500 each. Harry H. Fox, Route 6, Shelbyville, Indiana; phone Waldron 4181.

WANTED: Drillers for year round work. Must have good experience record on big hole and deep rock drilling and be competent to run job and supervise. Character references required. Hydro-Matics Corporation, Box 616, Milan, Illinois.

FOR SALE: Or will trade. Swivel rope socket, 14′ stem, 5″ bit, bailer, set of jars with 1⅝ x 2⅝ - 7 API joints. O. E. Lewis, Darlington, Indiana.

WANTED: Sober, hard-rock driller with at least 10 years experience. Must know bit dressing. High wages for right man. Steady work, all year, in eastern New York. Richard Carroll, Carmel, New York; phone Carmel 5-4486.

FOR SALE: All-steel, cable-tool drill similar to B-E 22-W, roller bearings, will swing 1500 lb. of tools. Extra-long-stroke walking beam, 2 cat-heads. Mounted on 2-ton Reo truck, 1947 model. All in fine condition. C. C. Rasmussen, Ida Grove, Iowa; phone 45 or 174.

POSITION WANTED: Young married driller, five years experience in all types of rotary drilling wishes job. Charles C. Nelson, 804 Osage, Salina, Kansas.

FOR SALE: Ferguson drilling machine with eccentric drop tool, in good condition. Will drill to 600 feet. Can be mounted on truck. Price $650. Virginia J. Slaton, Box 163, Bokchito, Oklahoma.

FOR SALE: New 3″ Bucyrus-Erie bit, 7′ long, 1⅛ x 1¾ pin; $25. Two Beco drive belts for 21-W; $20 each. Elevator for 1¼″ pipe; $5. FOB Troy, Alabama. All new, never used. W. G. Law, Troy, Alabama.

FOR SALE: Bucyrus-Erie 36L drill, serial #16495 with Buda gasoline engine, $8,000. Now drilling near Chicago. Box REM c/o Edward E. Johnson, Inc., 2304 Long Ave., St. Paul 14, Minnesota.

FOR SALE: Water-well service truck, good condition, 1945 model, K-7 International, 196″ wheel base; has 34 Tulsa winch with 3-speed take-off, steel bed, headache rack, gin poles, snatch blocks, two 30-gal. saddle gas tanks. Mileage less than 65,000. Price, $1,000. L. F. Bales, 707 N. Broadway, Sayre, Oklahoma; phone 867.

WANTED: Cable tool drilling machine similar to Bucyrus-Erie 24-W or 24-L or 60-L; also another machine comparable to Bucyrus-Erie 28-L. Please give full information as to condition, location and price. Sydnor Pump & Well Co., P. O. Box 1476, Richmond, Virginia.

WANTED: Competent cable tool driller for Bucyrus and Star machines; 6-inch wells, 160 feet to 250 feet deep; plenty of new pipe; bits sharpened in shop. Experienced, careful driller can make 550 to 600 feet per month at $0.75 per foot. Write: Gray Well Drilling Company, Box 181, Delafield, Wisconsin.

WANTED: Young man with some drilling experience and mechanical ability to learn to operate mechanical bit dresser, cut tool joints and do general shop work. Steady work, good chance to advance on sales and commissions. D. E. Edwards, West Branch, Iowa.

FOR SALE: Failing 500 rotary drill on International K-7 truck; 500′ drill pipe, bits and tools. A-1 condition. C. C. Rasmussen, Ida Grove, Iowa; phone 45 or 124.

FOR SALE: Mayhew 1000 rotary on 1948 Ford truck with tools, drill pipe, bits; now drilling 30-inch irrigation wells. Franks FA drill, 1500 foot capacity, complete with double drum, break-out table and automatic chuck. ELI rotary M7W, double drum, 40-foot derrick, 6 by 6 pump, 28 foot kelly. All priced to sell. Fred E. Butler, Box 481, Pueblo, Colorado.

FOR SALE: No. 40 Cyclone drill, eight months old, mounted on 1953 Ford truck. Has complete string of drilling tools and all the extras. Equipment is like new. Elmer K. Simon, 4870 Monroe Street, Toledo, Ohio.

FOR SALE: Two late-model well drilling machines. Cost $30,000 new. Will sell with tools for $10,500. Henry Merry, Duxbury, Massachusetts.

FOR SALE: Steel Cyclone spudder; 32-foot mast, 4 cylinder Le Roi engine mounted on 1942 Chevrolet truck. Can drill 4 inch, 6 inch and 8 inch wells. $1,600 with tools; $1,400 without tools. Lawrence Carter, c/o Knight's Road, Croyden, R. D. No. 1, Pennsylvania.

FOR SALE: Truck mounted rotary water well drills; Franks model FA: Mayhew 1000; and Sullivan 2000′ capacity machine on 1949 GMC truck. Fred E. Butler, Box 481, Pueblo, Colorado.

FOR SALE: Bucyrus-Erie 22T blast hole rig, excellent condition. Cat-mounted, rubber-cushioned sheaves; includes trailer for moving rig. Half price. Ray O'Loughlin, 50 Cleveland St., North Fond du Lac, Wis. Phone 4378.

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FOR SALE OR TRADE: Dempster No. 19 steel hydraulic machine; Failing 1000-A with 500 feet of drill pipe; two 5-inch, 12-stage, 3-phase Pomona deep well turbines, with 50-foot setting. Hedges Drilling Company, RFD No. 6, Lincoln, Nebr.

WANTED: Failing 1500 rotary drill with 5 x 6 pumps; or a similar machine. Hedges Drilling Company, RFD No. 6, Lincoln, Nebr.

FOR SALE: 21-W Bucyrus-Erie drill, 36′ telescoping derrick, catheads, type EB trailer mount, steel wheels available; 500′ of ⅝″ cable, 500′ of ⅜″ sand line. Price $2,000; Rowles Well Co., Hancock, Minn.

FOR SALE: String of 5″ tools; swivel rope socket for ⅞″ cable. Stem, bit, bailer and set of 4″ jars. Will trade for 3″ or 4″ tools, or what have you. O. E. Lewis, Darlington, Indiana.

FOR SALE: Model 33-W drill with telescoping derrick mounted on 2-ton Diamond T truck, both in excellent condition. One extra rebuilt LeRoi motor, never used. Priced reasonably. Wayne Lampman, Sr., Blue Mounds, Wis. Phone Mt. Horeb 2R9.

FOR SALE: Steel-frame, cable-tool machine mounted on 1938 Dodge truck; 38-foot mast, spring shock; 500′ of ⅞″ cable, 500′ of ⅜″ sand line; tools and bailer for 3″ and 4″ wells; 4-cyl. Wisconsin engine. Will drill 3″ wells to 400′; 4″ wells to 250′. Machine working steadily now. Price $1,800. Borman Plumbing & Heating Co., 9737 Lyndale Ave. S., Minneapolis, Minn. Phone South 1-9142.

FOR SALE: 5 h.p. Deming jet pump and motor; 220-440 V-3 phase. Pump has been overhauled by Deming factory and carries new pump guarantee. Price $300, f.o.b. Minneapolis. Borman Plumbing and Heating Co., 9737 Lyndale Ave. S., Minneapolis, Minn. Phone South 1-9142.

FOR SALE: One 300′ coil of new 1¾″ New Bedford manila drilling line. Cost $193.67, and will sell for 60% of that cost. Horner Well Drillers, 329 Strayer St., Johnstown, Pa.

FOR SALE: One used, long-style, jar bumper, 3¼″ fishing head. Can be used in 5⅝″ or larger hole. Weighs about 200 lbs. Cheap. E. C. Lenhart, 2606 Philmay Terrace, Mt. Penn, Reading, Pa. Phone Reading 41114.

FOR SALE: Steel Keystone drill mounted on 1941 Dodge truck. Rubber shock and cat head, complete with cable and all necessary tools for 6″ work. Price $1,200. Art Luisier, Rt. 1, Oconto Falls, Wisc.

FOR SALE: No. 71 Star drill, new and fully equipped, mounted on 2-ton International truck. Has 600′ of ⅝″ cable, 600′ of ⅜″ sand line, and 20′ bar. Will sell at good price. Ordean H. Torgerson, 1412 15th Ave. N., Minneapolis 11, Minn. Phone Ju. 4973.

FOR SALE: Solid rubber tire trailer for mounting well machine, $15. One 6 h.p. Fairbanks engine, $35. Lynr Matteson, Tustin, Mich.

FOR SALE: No. 40 Cyclone drill, 8 months old, mounted on 1953 Ford truck, all in new condition. Machine has all the extras and complete set of drilling tools. Elmer K. Simon, 4870 Monroe St., Toledo, Ohio.

WANTED: Graduate engineer or geologist. Must have at least five years experience with cable tool and rotary drilling methods and turbine pumps; to design, *sell* and supervise construction of water wells in Minn., N. D., S. D., Mont., Wisc., and Iowa for industry and municipalities. Salary plus profit sharing. Give experience and references in first letter. All replies held strictly confidential. McCarthy Well Co., 670 Eustis St., St. Paul, Minn. Nation's oldest and Northwest's largest since 1860.

WANTED: Cable tool and rotary drillers for large water wells. $1.90-$2.20 per hour plus time and a half over 40 hours, plus expenses. Work in Minnesota. Address reply to Box ABC, c/o Edward E. Johnson, Inc., 2304 Long Ave., St. Paul 14, Minn.

FOR SALE: No. 42 Cyclone drill mounted on 1947 Studebaker truck with good motor, two-speed rear axle, fair tires. Tool guide, cat head, spooling device, slack-line holder, gear reduction on bull reel for pulling casing, casing reel, starter and generator. Has 600' new 5⅝" drill cable and 600' of new ⅜" new sand line. Cat walks and tool box built on. Used six weeks, drilled ten 4" wells. Must sell because too big for our work. Price $5,800. Douglas Holzem, 1975 Prairie Ave., Beloit, Wis. Phone 2-3922.

WANTED: Old well drill with tools; prefer 2 x 3 x 8 thread. State make, condition, price and location. Briggs Well Drilling, Rt. 2, Aduance, Mo.

FOR SALE: Established well drilling business complete including Howell No. 60 all-steel machine with 4" to 10 " tools. Also wood-frame machine with 4" tools. Studebaker, 1-ton 1954 model pick-up. Stock of pipe, pumps, screens, fishing tools. Mrs. Edna Hosmer, Eagle Bend, Minn. Phone 126.

FOR SALE: Tools—15" spiral star bit, 12" straight star bit, 17" bit, 12" bit, 10" bit, all 4 x 5 — 7API joints; 15" bit and 8" bit, both 3¼ x 4¼-7API joints; 4½" x 20' stem, 5¼" x 13' stem, 5¼" x 17' stem, 6" x 12' stem, all with 3¾" pin, 5" box; 4" x 22' stem with 3¾" pin and box; wrenches, 5" and 6" square; 2 sets No. 2 tracks and jacks, combination 12" and 15" drive head, set drive clamps for 5" square, also 5½ Keystone drilling machine, very reasonable. O'Connor & Son, Spring Green, Wis.

WANTED: 1 set of 3" and 4" tools: 2" and 3" hollow rod tools. O. E. Lewis, Darlington, Ind.

WANTED: Sober, reliable, experienced rotary driller for Failing 1500 in sand and gravel formations. Don Roe, Box 211, Vandalia, Ohio. Phone 44514.

FOR SALE: Complete reverse hydraulic well drilling equipment. Sale forced by the death of the owner. Good equipment, excellent territory. Write Mrs. Vera Mattison, Minden, Nebraska.

ASSOCIATION NEWS

(Continued from Page 13)

The Eastern Section held a meeting on January 29 at which new officers were to have been elected. Details will be reported in the next issue of the *Journal*.

The Association recently published an attractive 24-page booklet to explain to well owners some fundamentals of ground water and well construction. In an interesting way, it emphasizes the role of a competent and responsible driller upon whom the owner must depend for developing his ground water supply. It emphasizes the value of the Association through which drilling contractors pool their experiences and knowledge. Many state drillers' groups would do well to study this publication and closely follow the results obtained from its use.

Ohio

New officers of the Ohio Water Well Drillers Association were elected at the December meeting. George D. Applegate of Newark was chosen president. A. J. Asher of Carlisle is first vice-president; Robert Saltzgaber of Mansfield is second vice-president; and R. H. Stein of Pemberville is secretary. L. D. Cranz, L. E. Bushong, Ralph Harley and Stanley Ruby serve as directors along with the officers.

George Applegate, the new president, died suddenly from a heart attack on January 7. The office of president, vacated by Mr. Applegate's untimely passing, was to have been filled at a meeting of the directors late in January.

Mr. J. E. Humphreys of Columbus was engaged by the Association to handle its first convention and exposition scheduled for February 16 and 17. This event will take place at the Neil House in Columbus. Manufacturers and suppliers have taken most of the exhibit space offered and the convention will certainly be worth while for every Ohio driller. The program will be of top quality.

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